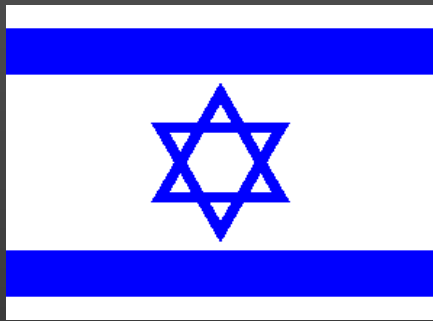


LFG UTILIZATION ASSESSMENT AND IMPLEMENTATION IN ISRAEL AND MEXICO



Eric R. Peterson, PE

Project Descriptions

- **Mexico - Monterrey Landfill**
 - **Active**
 - **Modern**
 - **No Collection System**
 - **8 MM tons in place**
 - **Electric Power Project Proposed**

Project Descriptions

- **Israel - Dudaim Landfill**
 - **Modern**
 - **Active**
 - **3 MM tons in place**
 - **LFG Collection/Flare 70 wells**
 - **Boiler Project Proposed**

Similar Conditions

- Arid to semi-arid climates
- High food wastes - 38 %
- First of kind in-country projects
- High energy costs

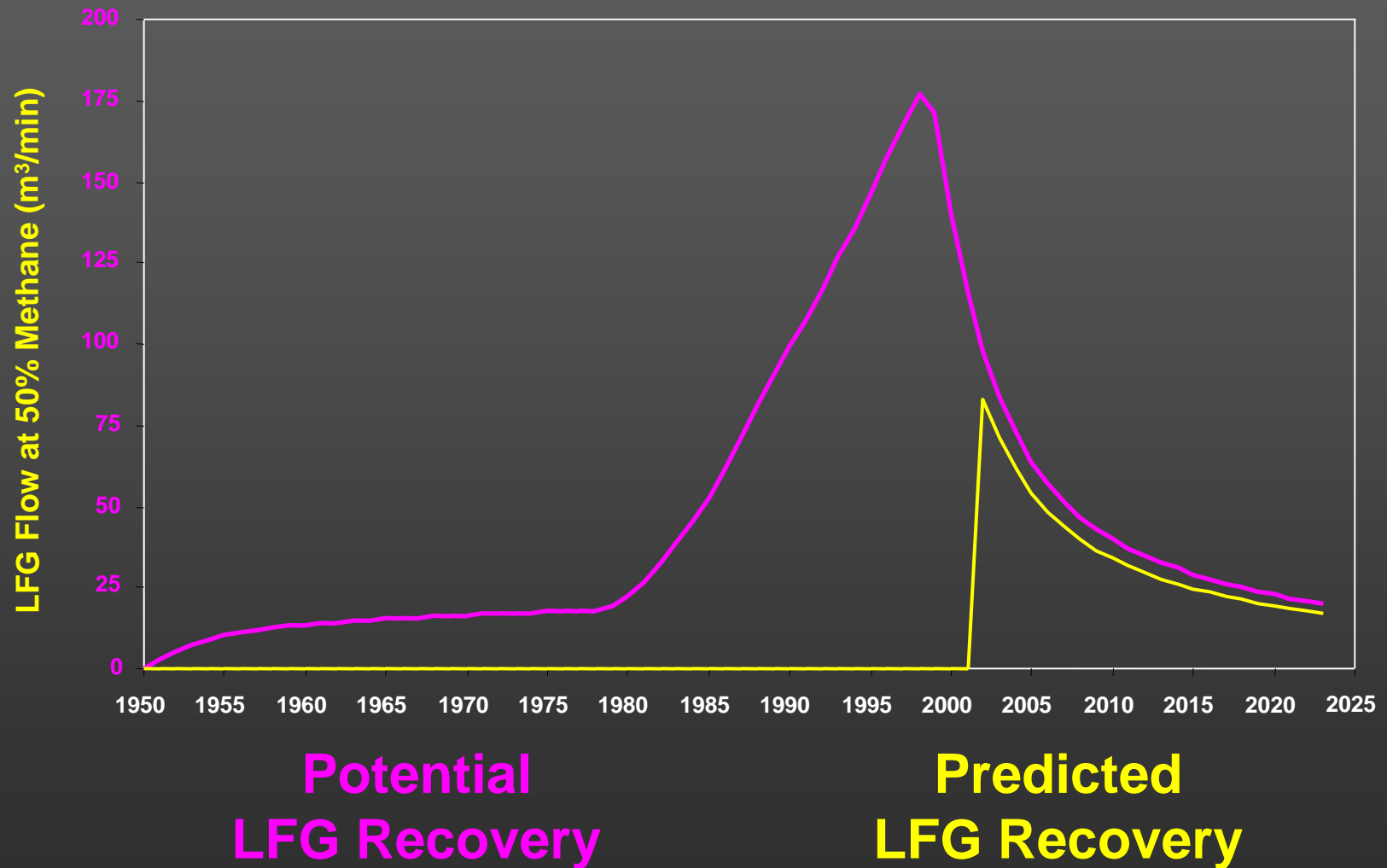
Waste Stream Comparison

COMPONENT	Percentage by Weight		
	Israel	U.S.	Mexico
Paper and Paperboard	22	31	14
Glass	3	6	8
Plastics	14	12	10
Food Wastes	38	14	38
Yard Waste	4	11	7
Other	10	4	9

Model Approaches

- Use multiple decay constants (k) for different degradable fractions (0.015 to 0.3)
- Reduce CH₄ Generation Potential (L_0) for water content in food waste
- Compare to test data

Hiriya Landfill, Tel Aviv, Israel



LFG Recovery Considerations

- High food/low paper waste = rapid LFG generation & decay
- Active landfill status important to utilization
- LFG is hot and wet despite arid climate
- Condensate must be addressed

Case Study - Monterrey Landfill

- World Bank (GEF) grant
- Power costs 8-11¢/kW-hr
- Municipally - Owned
- Open 20 more years



Test Program

- By ETEISA
- Verify methane decay rate
 - Estimate radius of influence
 - Measure gas quality
- Results
 - 1.7 cu m/min
 - >50% CH₄

Test Probes and Sampling



Obstacles

- **Mexico has national utility**
- **Provisions only for self-generation of power**
- **No LFGTE experience in Mexico**
- **Currency Risks**

Project Structure

- **Co-Generation Company will self generate power - 6-8 MWs**
 - **SIMEPRODESO - landfill owner**
 - **Turnkey developer (Strategic Partner)**
 - **2 municipal energy users**
- **CFE will transmit power and provide backup**

Project Status

- **Proposal/Selection process complete**
- **CLP (Firm from UK) selected**
- **Selection based on proposed NPV**
- **Co-generation company formed
12/01**
- **Design/Construction - 2002**

Replication Strategy

- **World Bank/GEF funding intended to replicate project**
- **Information sharing/training available after project start-up**
- **Candidate sites identified in pre-feasibility study**

Summary

- **GEF grant to reduce risk of 1st Mexico project**
- **Major GHG reduction benefits**
- **Significant energy savings**
- **Strategy for replication**

Summary

- **LFG to energy**
 - **Improve solid waste management practices**
 - **Improve air quality**
 - **Provides low cost renewable energy**
 - **Many opportunities in Mexico**

Case Study Dudaim Landfill

- LFG collection and flaring since April
- Energy user 5 km away
- Private funding for project
- Heavy fuel oil costs - \$3.90/MMBtu



Investigation

- End-user survey
- Gas testing of new probes and existing features
- LFG recovery modeling
- Environmental Issues
- Cost analysis



LFG Collection

- **Decision to install system w/ or w/o energy utilization**
- **System design and bidding (Fall 2000)**
- **System Construction (Winter 2001)**
- **Startup (Spring 2001)**

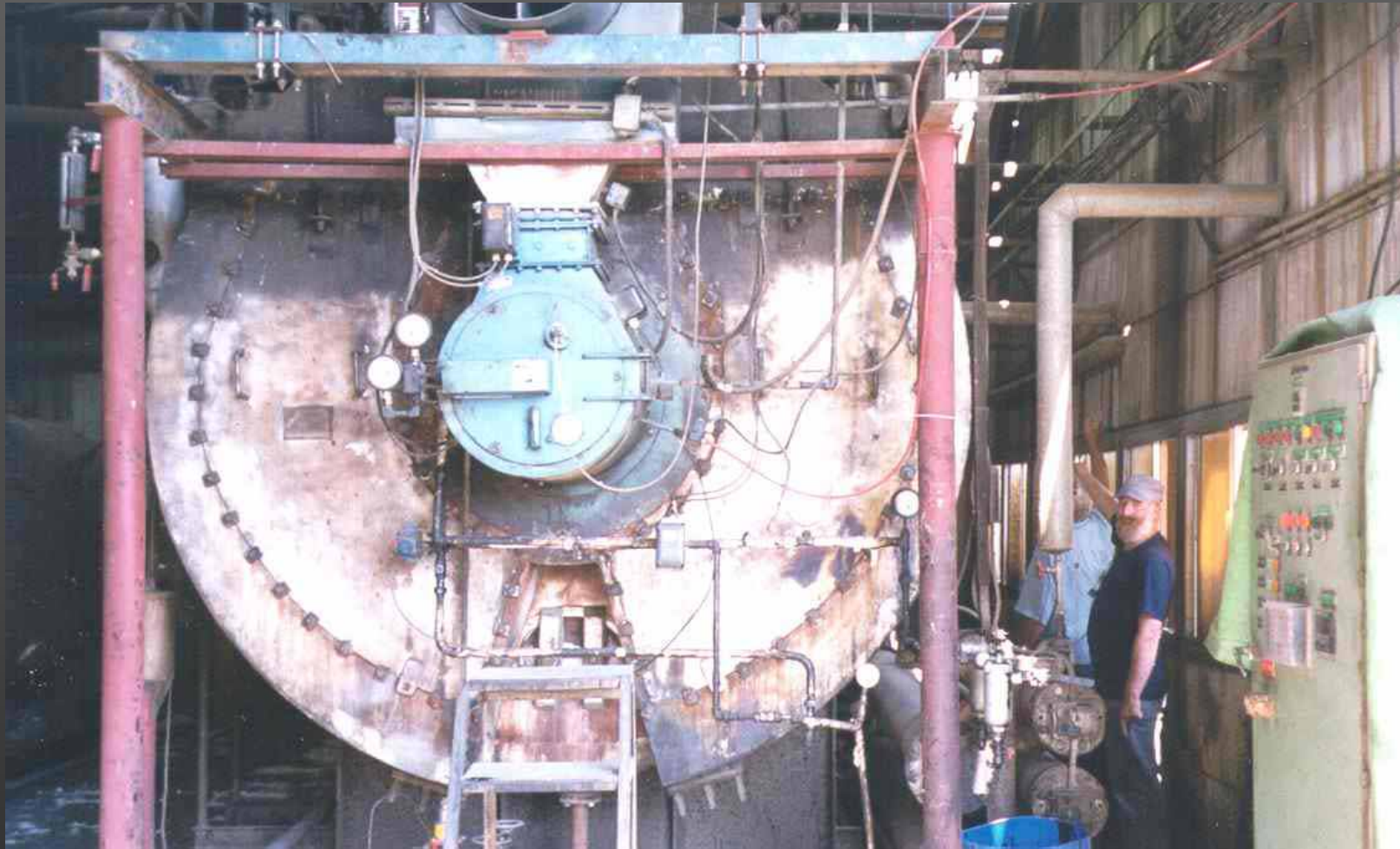


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Final Utilization Assignment

- Full scale system testing
 - Gas quality
 - Sustainable flows
- Good correlation with model
- Pipeline costs
- End user requirements





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Summary

- Pipeline should provide good economic return
- Other options being explored by owner
- Implementation expected in 2002
- Environmental benefits being realized now